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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,044	06/20/2003	Chris H. Wood	59673-31	5559

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EXAMINER

LAMPRECHT, JOEL

ART UNIT	PAPER NUMBER
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3737

MAIL DATE	DELIVERY MODE
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06/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,044	WOOD ET AL.	
	Examiner	Art Unit	
	Joel M. Lamprecht	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 01 March 2007.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-49 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-49 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date, _____.
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____.	6) <input type="checkbox"/> Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's arguments filed 3/1/07 have been fully considered but they are not persuasive. Regarding Applicant's argument and amendment to selectively performing either a two dimensional image resampling or a three dimensional image resampling based on the estimated amount of patient motion Examiner respectfully disagrees with the interpretation of the claims as set forth by Applicant. Thevenaz et al. states on page 33 that their algorithm can be customized to provide for modification in the event that 2d parameters need to be used within a 3d volume. Additionally, Thevenaz et al. provides 2d image resamplings and 3d image resamplings based on estimated patient motion (See page 29 for patient motion estimation's importance), transformations are selectively continued or performed based on this assessment and a convergence of data (Page 33). If the data is sufficiently accurate (that is under a specific a priori threshold), then registration need not continue.

With respect to the arguments laid out concerning Claim 15, the optimization of any of the parameters, that is partial optimizations of an image instead of a volume when a specific portion does not meet the requirements of an a priori threshold, is disclosed by Thevenaz et al. from page 31-33, ending with comments about practical issues which might arise. The convergence algorithms and selective continuations performed by Thevenaz et al. disclose a method of not continuing resampling if there is sufficient accuracy between the observed parameter values. Additionally, and in regard to Claim 29, the combination of thesholding, estimation. And comparison of image data

allows Thevenaz et al. to select various resampling parameters and perform different types of registrations based on the “near-perfect” match they are searching for.

Finally, let it be clear on the record that Examiner’s statement of Official Notice was not challenged by Applicant and is hereby submitted as common knowledge or well-known in the art with respect to the Claims 38-40 rejected within the previous action.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 12-15, 21, 22, 29, 35-41, 47-49 rejected under 35 U.S.C. 102(b) as being anticipated by Thevenaz et al. (IEEE Transactions on image processing Vol 7, No 1, Jan 1998).

3. Regarding Claims 1-5, Thevenaz et al. disclose a registration method comprising estimating patient motion within a set of medical images, selectively resampling based on that motion, the motion estimation taking place in a directional axis and corresponding to a lowest image resolution (Page 27 Col 2), and using an estimated motion procedure in a three dimensional rigid-body transformation (Page 29 Col 1 & 2). Additionally, a correction threshold is used to compare estimated patient motion and resampling based upon that comparison (Page 28 Col 1, and Page 29-30).

4. Regarding Claims 12-15, Thevenaz et al. disclose a resampling where in the event that patient motion equals or exceeds the threshold it uses one resampling procedure (a three dimensional image resampling), and performing a second image resampling procedure in the event that the estimated patient motion is less than the correction threshold (a two dimensional image resampling (Page 29 Col 2 – Page 30 Col 1; also Page 27 Col 1).

5. Regarding Claims 21 and 22 it is inherent that if a method is setup to perform a function as in Claim 15, the program, media, or method used from Claim 15 can be setup to do nothing in the event that the estimation of motion is less than the correction threshold by a set amount. When a threshold is set, as on Page 27 Col 2, 3-D registrations, as well as simpler transformations cant be preformed, of which avoiding an image resampling would be a much easier procedure than performing one.

6. Regarding Claims 29, 35-37, 41, 47-49 it is inherent that both a computer readable medium and a processor are required for MRI/PET 2D/3D registration procedures as it is mandatory to have both a computer and computer readable medium to be able to process the vast arrays of numbers and calculations taking place during a medical imaging procedure. The rest of the features encompassed by the Claims are disclosed by Thevenaz et al. as listed above.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 6-11, 16-20, 23-28, 30-34, and 42-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thevenaz et al. in view of Hill et al.

9. Regarding Claims 6-11, 16-20, 23-28, 30-34, and 42-46 Thevenaz et al. discloses all that is listed above, but does not touch on specific thresholding parameters, even though in a pyramid registration and deblurring it is hinted that the threshold is some fraction of the image resolution. Attention is then directed to the reference by Hill et al. which discloses a majority of the same information disclosed by Thevenaz et al. but also discloses more in depth descriptions of registration. Hill et al. discloses a method of finding a correction threshold in Section 11 where images are compared and corrected to a standard, a standard which can be as accurate as .5mm in size, much smaller than the .75mm suggested as a 0.5 fraction of a slice thickness from the Applicant's specification. Utilizing the error calculations disclosed in Section 11, as well as the logic in the first sentence from Section 11, it would have been obvious to one having normal skill in the art at the time of the invention to use the methods of comparing blurriness, and translation suggested by Hill et al. with the methods of convergence by Thevenaz et al. in order to quantify whether a particular image is within a correction threshold and would be "sufficiently accurate" for a given application, thereby discerning which algorithm to utilize.

10. Regarding Claims 11, and 28 Thevenaz et al. do not disclose characterizing an image signal relative to a background. Attention is directed then to section 10.3.1 from Hill et al. for a disclosure of signal intensity characterization relative to a background, a

precontrast ISI, and post contrast ISI. It would have been obvious to one in the art to use the methods disclosed by Hill et al. with the disclosure of Thevenaz et al. in the same area of endeavor, in order to facilitate registration with accurate representation of spatial resolution without interference by a background.

11. Regarding Claims 9, 10, 19, 20, 26, 27, 33, and 34 the Examiner has interpreted the Claims to read an "image resolution along a lowest image resolution axis" as some size of pixels or voxels in the smallest direction. Thevenaz et al. disclose a method for computing a correction threshold where multiple algorithms can be selected based on the Marquardt-Levenberg algorithm (see Section 3) but does not disclose a correction threshold along a lowest image resolution axis. Attention is then directed to the secondary reference by Hill et al. that again discloses a method for computing the accuracy of the resolution down to .5mm, which, in light of the specification, corresponds to a fraction of the voxel/pixel resolution along the lowest resolution axis. Therefore, it would have been obvious to one having normal skill in the art at the time of the invention to have incorporated the accuracy measures described in Hill et al. with the threshold selection process of Thevenaz et al. in order to utilize multiple algorithms selectively during a medical image registration.

12. Claims 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thevenaz et al. The system disclosed by Thevenaz et al. does not include a medical imaging system, MRI system, or a system for taking MRI images of a breast. It is indeed common knowledge to one working in the medical image registration arts that almost any MRI system that registers images could read as a teaching reference for

Claims 38-40; specifically a conventional MRI system if the desired images were MRI images, and that such a conventional MRI system is fully capable of imaging the human breast. Therefore it would have been obvious to one having normal skill in the art at the time of the invention to have included an MRI imaging system with the registration system of Thevenaz et al. if it was desired to have both an acquisition system and registration in combination, as is common within the art.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joel M. Lamprecht whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 7:30AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JML
6/22/07


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